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WHAT IS CLAIMED IS:

1	(1.) In a digital intermediate frequency downconversion circuit for
2	downconverting in-phase and quadrature signal components of a digitized communication
3	signal, a method for processing the in-phase and quadrature signal components of the digital
4	signal comprising:
5	processing a single serial digital bit stream formed of the in-phase and
6	quadrature signal components through a set of simple logic to produce a digital representation
7	of downconverted in-phase and quadrature components; and
8	recombining the digital representation of the downconverted in-phase and
9	quadrature components with a reconstruction filter in a manner to obtain a digital
0	representation of a baseband signal substantially free of image artifacts.
1	2. The method according to claim 1 further including the steps of:
2	employing an oversampled digital word of four bits in length from a source
3	digital oscillator as a reference signal;
4	supplying digital signal mixers with said reference signal to achieve at least
5	sixteen levels of accuracy as a sine wave mixing signal without significant phase or
6	amplitude error;
7	mixing the digitized serial bit stream according to a clock with output of a
8	four-bit wide table representing the reference signal;
9	recombining digitally the in-phase and quadrature signals to obtain a digitally
0	combined signal; and
1	binary weighting the combined signal into a digital reconstruction filter to ()
2	produce a downconverted signal is unaffected by resistor tolerance.
1	In a digital IF downconversion circuit for downconverting in-phase
2	and quadrature signal components of a digitized communication signal, a processor for in-
3	phase and quadrature signal components of the digital signal comprising:
4	logic for processing a single serial digital bit stream formed of the in-phase
5	and quadrature signal components to produce a digital representation of downconverted in-
6	phase and quadrature components; and
7	a digital reconstruction filter for recombining the digital representation of the
8	downconverted in-phase and quadrature components in a manner to obtain a digital
9	tenresentation of a baseband signal substantially free of image artifacts.

	1	4. The circuit according to claim 3 further including:
	2	a source digital oscillator supplying digital signal mixers with an oversampled
	3	digital word of four bits in length to achieve at least sixteen levels of accuracy for a sine wave
	4	mixing signal without significant phase or amplitude error.
		5. The circuit according to claim 1 further including resistor means
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	2	coupled to input of the digital reconstruction filter for binary weighting the digital
	3	recombined signal produce a downconverted signal is unaffected by resistor tolerance.
	1	6. A method of image rejection processing of a received RF signal,
	2	comprising:
Ł	3	performing downconversion of the received RF signal to produce analog I and
1	4	Q signals; and
Line State Sparie	5	for each of the analog I signal and the analog Q signal:
, e	6	oversampling the analog signal to obtain an oversampled digital signal;
Half Half Kon	7	producing a periodic oversampled digital reference signal; and
7	8	logically combining the digital signal with the digital reference signal
À	9	to produce an image-canceled digital baseband signal.
P. 4ml north To Com		7. The method of claim 6, comprising:
Trong St	1	converting the digital baseband signal to an analog baseband signal.
ž	2	converting the digital baseballd signal to all analog baseballd signal.
	1	(8.) An image reject circuit apparatus comprising:
	2	a first frequency downconversion circuit employing a first local oscillator for
	3	downconverting in-phase and quadrature signal components of a digitized communication
	4	signal to a first intermediate frequency;
	5	sigma delta converters for generating an in phase digital bit stream and a
	6	quadrature phase digital bit stream;
	7	a digital in-phase and quadrature phase second local oscillator;
	8	mixing circuitry for mixing respective single serial digital bit stream in-phase
	9	signal and single serial digital bit stream quadrature phase signal through a set of logic gates
	10	to produce a digital representation of downconverted in-phase and quadrature components;
	11	and

12	weighting resistances in series with the outputs of the logic gates for
13	combining the digital representation of the downconverted in-phase and quadrature
14	components according to value in an in-phase signal and in a quadrature phase signal; and
15	reconstruction filters to recover in-phase and quadrature phase baseband
16	signals from said downconverted in-phase and quadrature components substantially free of
17	image artifacts.
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1	9. The image reject circuit apparatus according to claim 8 wherein said
2	mixing circuitry comprises, for each significant bit:
3	first and second exclusive-OR gates coupled to receive as first input an in
4	phase digital bit stream and as second inputs a high accuracy sine function bit stream and a
5	high accuracy cosine function bit stream;
}≟6 :≖	third and fourth exclusive-OR gates coupled to receive as first input a
	quadrature phase digital bit stream and as second inputs a high accuracy sine function bit
148	stream;
19	first OR gate for logically adding the outputs of the first and second XOR
TO	gates for the in-phase channel;
41	first AND gate for logically multiplying the outputs of the first and second
12	XOR gates for the in-phase channel;
B	second OR gate for logically adding the outputs of the third and fourth XOR
IA	gates for the quadrature phase channel; and
15	second AND gate for logically multiplying the outputs of the third and fourth
16	XOR gates for the quadrature phase channel.
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1	10. The circuit apparatus according to claim 9 wherein the reconstruction
2	filter comprises:
3	weighting resistors for each output of each of the first and second AND gates
4	and first and second OR gates, said weighting resistors defining a binary weight for its
5	corresponding bit;
6	a first lowpass filter means at a first combining node of the first AND gate and
7	first OR gate;
8	a second lowpass filter means at a second combining node of the second AND
9	gate and second OR gate;

10	wherein each said weighting resistor of the in-phase channel is connected to
11	said first lowpass filter; and
12	wherein each said weighting resistor of the quadrature phase channel is
13	connected to said second filter
14	to yield respective analog I and Q channel signals at baseband.